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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,496	06/23/2005	Myoung-Kyun Shin	29347/50798	4171

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EXAMINER

MC GUTHRY BANKS, TIMA MICHELE

ART UNIT	PAPER NUMBER
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1793

MAIL DATE	DELIVERY MODE
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07/29/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/540,496

Applicant(s)

SHIN ET AL.

Examiner

TIMA M. MCGUTHRY-BANKS

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date 3/31/08
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

Claims 1, 2, 6 and 7 are currently amended, Claims 3-5 and 8 are as previously presented, and Claims 9-16 are cancelled.

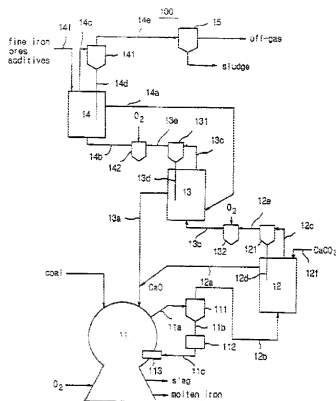
Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al (US 6,277,324 B1) in view of JP 07-188721 (abstract and machine translation).

Joo et al teaches manufacturing molten pig iron by using a fine iron ore as shown in Figure 3 below.

FIG. 3



Fine iron ore and additives are added via supplying pipe 14f. The ore is heated and pre-reduced in fluidized bed 14. It is inherent that the iron ore and additives would be dry, since the temperature is 700-800 °C (column 6, line 67). The preheated and prereduced iron ore is charged into the second fluidized bed 13 and further to calcining furnace 12 for further reduction (column 7, lines 24-29). The melter gasifier 11 is charged with coal, which produces a reducing gas for reducing the iron ore and for calcining (lines 45-47). As shown in the figure, molten iron is tapped from the furnace and oxygen is added. If the supplied gas has too low a temperature, a proper amount of oxygen may be supplied to gas heaters 142 and 132 to burn part of the reducing gas (column 7, lines 13-16); the heaters are upstream from the reaction furnaces

(column 8, lines 42 and 43). Regarding Claim 5, oxygen is added when the temperature is below 650 °C (column 7, line 3). However, Joo et al does not teach directly supplying and combusting oxygen to and in the fluidized bed as in Claim 1.

JP '721 teaches a method for pre-reducing iron ore and a pre-reduction furnace. Oxygen or gas containing oxygen is supplied into the fluidized bed to execute the partial combustion of the reducing gas (abstract). Though JP '721 teaches using a smelting reactor for the reduced ore, the teaching of adding oxygen or gas containing oxygen to a fluidized bed is not limited to a smelting reactor in the process. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the pre-reduction process of JP '721 in the process of Joo et al, since JP '721 teaches that reactivity is improved and the reduction reaction of iron ore can be advanced efficiently ([0028] of machine translation). Also, partial combustion of the reducing gas serves as a big advantage in the field of energy efficiency [0013].

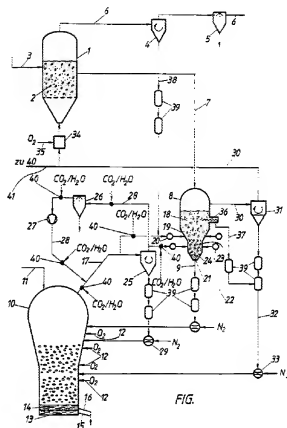
Claims 2-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joo et al in view of JP '721 as applied to Claim 1 above, further in view of Kepplinger et al (US 6,379,420 B1).

Joo et al in view of JP '721 discloses the invention substantially as claimed. However, Joo et al in view of JP '721 does not disclose adding H₂O as in Claims 2 and 3, the flow rate in Claim 4 or the steps of directly supplying and combusting oxygen as in Claims 6 and 7.

Kepplinger et al teaches a method for producing a hot CO and H₂-containing reducing gas serving for the reduction of fine-grained metal ore (abstract). Regarding Claim 2, to attain intensive cooling of the reducing gas, cooled reducing gas of the same type is advantageously

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admixed to the reducing gas and H_2O is added into the cooled reducing gas of the same type (column 2, lines 55-69) prior to being fed to the fluidized bed (see Figure below).



Regarding Claim 3, the water is a vapor (lines 46 and 47). Regarding Claim 4, a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation; therefore a *prima facie* case of obviousness exists. See MPEP § 2144.05 II B. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add water to the process of Joo et al in view of JP '721, since this addition prevents the Boudouard and heterogeneous water-gas reaction and resultant

heating of the reducing gas, and results in a reducing gas that is thermodynamically more stable (abstract).

Regarding Claim 6, partially oxidized reducing gas is combusted for heating the reducing gas in a combustion chamber 34 into which there runs a duct 35 for supplying an oxygen-containing gas (column, lines 37-42). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combust the reducing gas going to the preheating furnace in Joo et al in view of JP '721 with an oxygen-containing gas as disclosed by Kepplinger et al, since it is well known in the art that combusting reducing gases helps to control reaction temperature, as taught in both Kepplinger et al and Joo et al.

Regarding Claim 7, it is obvious that the step of directly supplying and combusting the oxygen would occur before the pre-heating step, so that the heating of the iron ore and additives can take place. Regarding Claim 8, the water is not added with oxygen.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMA M. MCGUTHRY-BANKS whose telephone number is (571)272-2744. The examiner can normally be reached on M-F 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. M. M./
Examiner, Art Unit 1793
29 July 2008

/Roy King/
Supervisory Patent Examiner, Art Unit
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